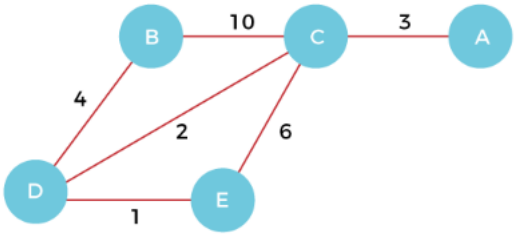
SVKM's
D. J. Sanghvi College of Engineering

Program: B.Tech in Computer Science and Engineering (Data Science) **Academic Year: 2022** **Duration: 3 hours**
Date: 21.01.2023
Time: 09:00 am to 12:00 pm
Subject: Data Structures and Algorithms (Semester III) **Marks: 75**

`

Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover page of the Answer Book, which is provided for their use.

(1) This question paper contains 2 pages.
(2) All Questions are Compulsory.
(3) All questions carry equal marks.
(4) Answer to each new question is to be started on a fresh page.
(5) Figures in the brackets on the right indicate full marks.
(6) Assume suitable data wherever required, but justify it.
Draw the neat labelled diagrams, wherever necessary.

Question No.		Max. Marks
Q1 (a)	Write a C program to implement Binary Search function? **OR** Explain Linked List as ADT.	[05] [05]
Q1 (b)	i. Write a C program to implement insert( ) function of a Priority Queue. ii. Construct an AVL Tree for given numbers: 63,9,19,27,18,108,99,81	[05] [05]
Q2 (a)	Consider a Hash table of size = 10. Using Double Hashing, insert the keys 72, 27, 36, 24, 63, 81, 92 and 101 into the table. Take h_1=(k mod 10) and h_2=(k mod 8). **OR** Write a C program to check whether the given expression has balanced set of parenthesis or not using stack.	[10] [10]
Q2 (b)	Apply step by step Quick Sort on the following set of numbers: 50,30,10,90,80,20,40,70	[05]
Q3 (a)	Write a function using C program to sort Singly Linked List in ascending order. **OR** Explain different Graph representation techniques using example.	[05] [05]
Q3 (b)	i. Write a Program to implement Stack using array. **OR** i. Find cost of MST using Prims Algorithm. Consider node B as a Source node.  	[10] [05] [05]

	ii. Write a C program to implement insertion sort.	
Q4 (a)	Given an infix expression, convert it to a respective postfix expression using stack. (A-(B/C+(D%E*F)/G)*H) **OR** i. Write BFS algorithm. ii. Consider the following five functions: $F1=10^n$, $F2=n^{(1/3)}$, $F3=n^n$, $F4=\log_{10}(\log_{10} n)$, $F5=2^{\sqrt{\log_{10} n}}$ Arrange above functions in ascending order.	[08] [04] [04]
Q4 (b)	Define time complexity and explain Asymptotic Notations.	[07]
Q5 (a)	**Write short note on any two of the following:** i. Types of Hash functions ii. Applications of stack iii. Advantages of Doubly circular LL over singly LL iv. DEqueue	 [05] [05] [05] [05]
Q5 (b)	Create a Binary Tree when Inorder: DBHEIAFJCG Postorder: DHIEBJFGCA	 [05]